Remarks/Arguments

Claims 1-20, 22, and 23 remain in this application. Claim 21 has been canceled.

General Reply to Claim Rejections – 35 USC §112

Examiner Hirl states:

"The Examiner has full latitude to interpret each claim in the broadest reasonable sense. Examiner will reference prior art using terminology familiar to one of ordinary skill in the art. Such an approach is broad in concept and can be either explicit or implicit in meaning." Examiner Hirl further states, "While the material in the specification maybe allowable, the claims warrant rejection. Simply stated, the claims have not brought forth the applicant's invention."

Applicant appreciates Examiner Hirl's candid points and the acknowledgement of the existence of allowable material in the specification.

Applicant respectfully responds that the claims are drafted in a manner that conforms to the most basic patent law covering claim construction and PTO rules of practice.

35 USC §112 paragraph 6 states:

"An element in a claim for a combination may be expressed as a means or step for performing a specified function *without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.* (Amended July 24, 1965, Public Law 89-83, sec. 9, 79 Stat. 261; Nov. 14, 1975, Public Law 94-131, sec. 7," [*emphasis* added]

The PTO "Rules of Practice" Rule 75 part (d)(1):

The claim or claims must conform to the invention as set forth in the remainder of the specification and *the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description..."* [*emphasis* added]

Applicant has written the claims using the specific language contained in the specification. Decision tree regulation is described in preceding US Patent Application No. 09/972,057, which is incorporated into the application on paragraph [0048]. The

improved method of regulation claimed is introduced in section II. Decision Regulation Using Global and Population Characteristics. The terms and phrases that describe decision regulation and global or population characteristics that are used in the claims thus have clear antecedent basis within the patent application description and the recital of their structure is not required in the step plus function language of the claim.

The claims are amended to further clarify and distinguish their differences from Guyon. Further, as required by Rule 75, the specification serves as a dictionary (i.e. meaning of the terms) for the claims. Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure and that only where terminology is *not* contained in the specification can the interpretation be made on the basis of terminology familiar to one of ordinary skill in the art.

General Reply to Claim Rejection – 35 USC §101 and 35 USC §112

Examiner Hirl states:

"The claimed invention is directed to non-statutory subject matter. The language of the claim raises a question as to whether the claim is directed merely to an abstract idea that is not tied to a technology art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 USC §101."

Examiner Hirl further states:

"Claims 1-23 are rejected under 35 USC 112, first paragraph because current case law require such a rejection if 101 rejection is given ..."

Applicant respectfully responds that the claims are written in Jepson style. For example, in Claim 1 the first part of the claim is an introduction that sets forth the environment of the invention and the second part claims the essence of the invention, that is, the improvement. The environment of the invention is disclosed as a method for collecting global or population characteristics for creating a regulated decision characteristic for at least a portion of the decision tree. The improvement is the use of global or population characteristics to achieve robust decisions for applications in spite of the application dynamics and/or errors in training data.

The need and the utility that would result in practical applications to produce a concrete, useful, and tangible result are specifically described in the background of the invention. Paragraph [0002] of the specification states:

"Many decision system applications such as data mining, automatic process control, automatic target recognition, intelligent search, and machine vision perform decision making using rules derived from offline training or online learning. Decision rules encapsulate the knowledge acquired from the application and transform it into recipes to

make decisions on new data. Decision rules are responsive to the training data used to create them. However, they do not necessarily yield robust performance in the application they were intended to service. General decision rules that are domain independent generally do not perform well. Yet, expert systems that are highly domain specific are frequently not robust to changes and variations."

Paragraph [0007] of the specification states:

"However, the above decision tree based prior art relies on local data assessment in nodes deep in the tree. The local data inherently hinders the proper separation of noise from the application domain's consistent characteristics. Local data only represents partial information of the data distribution. Local nodes with small numbers of samples could contain outliers yet in many cases they contain data bearing consistent characteristics. The discrimination between noise and real signal cannot be simply determined based on the local information. Furthermore, prior art terminal node class assignment is based on the relative counts of training samples from different classes. Unequal prevalence of training samples from different classes can significantly impact the classification result."

Furthermore the practical utility of the invention is the subject of the Summary of Invention in paragraph [0010] of the specification:

"Incorporating global information and local information in making decisions at a node regulates decision characteristics in hierarchic decision systems. It also compensates for the prevalence difference of different training classes. This regulation method decreases noise and increases accuracy. Conventional crisp decision tree construction can realize significant improvement in robustness if the pruning process incorporates information integration of the invention. Regulated decision systems can also use integrated confidence values or reliability measures as their evaluation function when partitioning data at a node."

General Reply to Claim Rejection – 35 USC §102

Examiner Hirl states:

"Claims 1-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Guyon et al (US Pub. 2003/0172043,…)."

We respect that Examiner Hirl is exercising his latitude to broadly map one method to the other. Yet the method of Guyon and our invention are dramatically different and therefore it is hard to draw parallel between these two methods. Applicant respectfully submits that The fundamental difference between the two methods could not be simply ignored in light of our reply to Claim Rejections – 35 USC §112.

Guyon disclosed the use of a well-known pattern recognition method called Support Vector Machines (SVM) and RFE (Recursive Feature Elimination) for identification of patterns that are useful for medical diagnosis. Its focus is to overcome the shortcomings of the neural networks (Guyon, p 0014) including local minimums, slow learning, quality of approximation, and especially, the "curse of dimensionality" (Guyon, p 0013). This is achieved by the kernel trick and the Vapnik-Chervonenkis ("VC") dimension (Guyon, p 0015).

Even though the SVM could address the very high dimensionality problem, it suffers from the common problem of errors in the training data. This weakness is revealed In Guyon, p 0026:

"Some of the original coordinates may be noisy or irrelevant to the problem and therefore more harmful than useful."

Our invention could handle the noisy data through decision regulation to achieve robust decision. In contrast, Guyon teaches away the possibility of handling the noisy data in the decision classifier itself. It teaches the uses of pre-processing to avoid the problem (Guyon, p 0026). This underscores our invention which does not require preprocessing as unanticipated improvements over Guyon. Furthermore, no suggestion of information integration, unequal class prevalence compensation, etc. can be seen in Guyon. This is because the SVM and the decision regulation methods are fundamentally different and are hard to draw parallel.

The detailed remarks are discussed for each claim as follows

Claim 1

Claim 1 is amended to clearly state the decision system applications and the utility of robust decisions. This is to overcome Examiner Hirl's 35 USC §101 and 35 USC §112 rejection.

Further, through the Jepsen form, the claims properly set forth the applicant's invention. Global and population characteristics and their use in a regulated decision characteristic in a decision tree constitute a claim supported by an antecedent basis that is well described in the specification: See section II.2 Classification Regulation by Information Integration, paragraph [0101].

> "The global and population characteristics of this invention provide a
> framework for classification decision regulation that discriminates
> between noise and consistent application characteristics. It also allows
> a correction for prevalence discrepancy in the training data."

Examiner Hirl rejected claim 1 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"(Guyon, Fig. 9; EN: the global and population characteristics are axiomatic to the input data structure)."

Guyon does not discuss global or population characteristics as described in Section II.1.1 through Section II.1.4. The Guyon figure 9 samples are not characterized for global or population characteristics. Applicant respectfully traverses Examiner Hirl's rejections based on the above arguments.

Claim 2

Claim 2 is amended to clearly state the prevalence independent characterization by the population characteristics as the basis for unequal class prevalence compensation. This is to overcome Examiner Hirl's 35 USC §101 and 35 USC §112 rejection.

Examiner Hirl rejected claim 2 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"Guyon anticipates decision characteristic compensates for unequal class prevalence in the training samples (Guyon, p 0079)."

Although Guyon disclosed a preprocessing stage to "expanding data", upon a closer reading it becomes clear that the "expanding data" merely alters the dimensionality of the input data. It has nothing to do with the class prevalence. Furthermore, Guyon's preprocessing attempted to alter the data before the decision system is constructed. This teaches away from the decision regulation approach of the current invention that characterizes decision system after its construction and compensates for unequal class prevalence through population characteristics of a constructed decision tree and does not require preprocessing.

The prevalence independent characterization of tree node of the present invention that compensates for unequal class prevalence in the training samples is patentably distinct from the Guyon "expanding data".

Applicant respectfully traverses Examiner Hirl's rejections based on the above arguments.

Claim 3

Claim 3 is amended to clearly state global characteristics and population characteristics discriminates between noise and consistent application characteristics. This is to overcome Examiner Hirl's 35 USC §101 and 35 USC §112 rejection.

Examiner Hirl rejected claim 3 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"Guyon anticipates decision characteristic compensates for errors in the training data (Guyon, p 0031)."

Although Guyon disclosed a SVM method that could reach zero leave-one-out error with at least as few as two genes. This has nothing to do with the discrimination between noise and consistent application characteristics. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 4

Examiner Hirl rejected claim 4 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"Guyon anticipates the global characteristic include global count (Guyon, p 0185; EN: predictive statistics would include global counts)."

Although Guyon cites a global combined graph, upon a closer reading it becomes clear that it is for the combined information such as multiple alternative candidate subsets of selected features with scores attached to them. The global counts of the current invention is clearly not related to the global combined graph of Guyon. The global counts of the current invention is clearly defined in the section II.1.3 of the specification (paragraph 0091-0095).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 5

Examiner Hirl rejected claim 5 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"Guyon anticipates the global characteristic include global population statistic (Guyon, p 0185)."

Guyon cites a global combined graph that it is for the combined information such as multiple alternative candidate subsets of selected features with scores attached to them. The global population statistic of the current invention is clearly not related to the global combined graph of Guyon. The global population statistic of the current invention is clearly defined in the section II.1.4 of the specification (paragraph 0096-0099).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 6

Examiner Hirl rejected claim 6 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"(Guyon, p 0193; EN: local population statistics relate to for every gene selected, there are only two alternatives)."

Guyon describes a binary decision tree of depth 4. It consists of eight terminal nodes. Therefore, there are only two alternative gene selections and the selection is limited to four genes. The local population statistic of the current invention is the weighted training sample proportion for a class at a node. The local population statistic of the current invention is clearly defined in the section II.1.2 of the specification (paragraph 0086-0090). It is clearly not related to the gene selection of Guyon as disclosed in Guyon, p 0193. Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 7

Claim 7 is amended to clearly state the decision system applications and the utility of robust decisions. This is to overcome Examiner Hirl's 35 USC §101 and 35 USC §112 rejection.

Examiner Hirl rejected claim 7 under 35 U.S.C. § 102(e) as being anticipated by Guyon.

Examiner Hirl cited Guyen p 0194 and stated that the global characteristics and population characteristics will be along the path to the leaf node. The global characteristics and population characteristics are clearly defined in the specification section II.1, paragraphs 0082-0099. They are not as simple as the characteristics along the path of the leaf node. Examiner Hirl cited Guyen p 0207 anticipated confidence value and integrated confidence value. Guyen did disclose a classification confidence. However, upon close examination, it is clear that Guyen's classification confidence is a measure of fraction of errors computed both on the independent test set and using the leave-one-out method on the training set. They are distinctively different from the confidence values derived from each type of the characteristics and the integrated confidence value as described in Section II.2, specification paragraphs 0100 - 0108.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 8

Examiner Hirl rejected claim 8 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"Guyon anticipates assigning the class with the maximum integrated confidence value as the decision for the terminal node (Guyon, p 0088)."

Guyon describes the determination of whether an optimal solution has been ascertained. This may be performed manually or through an automated comparison process. Guyon disclosed neither integrated confidence value nor the use of the value for class assignment in the terminal node whose antecedent basis is disclosed in paragraph 0109 of the current specification and is clearly distinctive from Guyon.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 9

Examiner Hirl rejected claim 9 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"Guyon anticipates the integrated confidence value as the likelihood value (Guyon, p 0067)."

Guyon's likelihood value is a loose association between measurements and effects, and is distinct from the assignment of likelihood based upon an integrated confidence measure whose antecedent basis clearly distinguishes from Guyon on specification paragraph 0110-0111.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 10

Examiner Hirl rejected claim 10 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Specifically, Examiner Hirl stated

"(Guyon, Figs. 1; EN: synonymous to input data)."

Global characteristics and population characteristics selected from the group consisting of global counts, local counts, global population statistic, and local population statistic are specific measures of training data characteristics, whose antecedent basis is described in

section II.1 of the specification. These measures are distinct from the processes and the inputs described in Guyon Figure 1.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 11

Examiner Hirl rejected claim 11 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0207.

Based on the same arguments as that for claim 7, Guyon, p 0207, is not related to the confidence values of the current invention. The antecedent basis for local count confidence, local population confidence, global count confidence and global population confidence are given in the specification section II.1. These measures are patentably distinct from the metrics of classifier quality and classification confidence measures described in Guyon (p0207).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 12

Examiner Hirl rejected claim 12 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0364.

The antecedent basis for the integrated confidence value given in paragraphs 0106-0108 of the specification is patentably distinct from the metrics of Golub's classifier described by Guyon which relates to well known linear discriminant functions. The integrated confidence value is a weighted combination of patentably distinct confidence values which are not described in Guyon (p0364).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 13

Examiner Hirl rejected claim 13 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0364. Examiner Hirl states "global context coverage is simply what applies and what does not apply."

The antecedent basis for the global context coverage that is adjusted using different layer depths given in paragraph 0094 of the specification is patentably distinct from the weight of Golub's classifier described by Guyon which relates to well known linear discriminant functions (Guyon, p0364).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 14

Examiner Hirl rejected claim 14 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0082. Examiner Hirl states "it is axiomatic that coverage of the model is only as good as the training data base."

The antecedent basis for the global context coverage that is adjusted on a minimum number of training samples given in paragraph 0095 of the specification is patentably distinct from the determination of whether the training output is desirable using error threshold as described in Guyon, p 0082.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 15

Claim 15 is amended to clearly state the decision system applications and the utility of robust decisions. This is to overcome Examiner Hirl's 35 USC §101 and 35 USC §112 rejection.

Examiner Hirl rejected claim 15 under 35 U.S.C. § 102(e) as being anticipated by Guyon.

Examiner Hirl cited Guyen p 0207 as anticipating regulated measure selected from the group consisting of integrated confidence values and reliability measures.

Based on the same arguments as those for claims 7 and 11, Guyon, p 0207, is not related to the integrated confidence values and reliability measures the current invention. The antecedent basis for integrated confidence values and reliability measures are given in the specification paragraphs 0106-0108 and paragraphs 0128-0133. These regulated measures are patentably distinct from the metrics of classifier quality and classification confidence measures described in Guyon (p0207).

Examiner Hirl cited Guyen p 0128 as anticipating pruning the terminal nodes by combing the two terminal nodes and converting the associated non-terminal nodes into one terminal node. Guyon, p 0128, is for the pruning of the original input features. It is not

related to the pruning of the terminal nodes. The antecedent basis for pruning the terminal nodes by combing the two terminal nodes and converting the associated non-terminal nodes into one terminal node is given in the specification paragraphs 0114-0125. This tree terminal node pruning method is patentably distinct from the feature pruning method described in Guyon (p0128).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claims 16 - 18

Examiner Hirl rejected claims 16-18 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0207. Examiner Hirl states "confidence and reliability are synonymous; all examples of the training data were tested."

Based on the same arguments as those for claims 7, 11 and 15, Guyon, p 0207, is not related to the reliability measures of the current invention. The antecedent basis for the reliability measures are given in the specification paragraphs 0128-0133. These reliability measures are patentably distinct from the metrics of classifier quality and classification confidence measures described in Guyon (p0207).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 19

Examiner Hirl rejected claim19 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0207. Examiner Hirl states "confidence and reliability are synonymous; the leave-one-out is a combined reliability metric."

Based on the same arguments as those for claims 7, 11, 15, 16, 17 and 18, Guyon, p 0207, is not related to the reliability measures of the current invention. The antecedent basis for the combined reliability measure is given in the specification paragraphs 0132-0135. This combined reliability measure is patentably distinct from the metrics of classifier quality and classification confidence measures including the fraction of errors computed using the leave-one-out method as described in Guyon (p0207).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 20

Examiner Hirl rejected claim 20 under 35 U.S.C. § 102(e) as being anticipated by Guyon, p 0207. Examiner Hirl states "confidence and reliability are synonymous; the leave-one-out is a global reliability metric."

Based on the same arguments as those for claims 7, 11, 15, 16, 17, 18 and 19, Guyon, p 0207, is not related to the reliability measures of the current invention. The antecedent basis for the global population reliability measure is given in the specification paragraph 0131. This global population reliability measure is patentably distinct from the metrics of classifier quality and classification confidence measures including the fraction of errors computed using the leave-one-out method as described in Guyon (p0207).

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 22

Examiner Hirl rejected claim 22 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Examiner Hirl states "(Guyon, p 0207; 0128; EN: follows from better classification performance)."

Based on the same arguments as those for claims 7, 11, 15, 16, 17, 18, 19 and 20, Guyon, p 0207, is not related to the reliability measures of the current invention. Based on the same arguments as those for claim 15, Guyon, 0128, is for the pruning of the original input features and is not related to the pruning of the terminal nodes.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Claim 23

Claim 23 is amended to clearly state the decision system applications and the utility of robust decisions. Furthermore, step (e) is amended to fix the gap between the steps by including iteration. This is to overcome Examiner Hirl's 35 USC §101 and 35 USC §112 rejection.

Examiner Hirl rejected claim 23 under 35 U.S.C. § 102(e) as being anticipated by Guyon. Examiner Hirl cited Guyen p 0082 and p0207 as anticipating candidate thresholds, data partition, integrated confidence value and reliability measures, and select the partition.

Based on the same arguments as those for claims 14 (for Guyon, p 0082) and claims 7, 11, 15, 16, 17, 18, 19, 20, and 22 (for Guyon, p 0207), Guyon's method is not related to the integrated confidence values and reliability measures based node partition of the current invention.

The antecedent basis for the integrated confidence values and reliability measures based node partition given in section II.4, paragraphs 0139-0142, of the specification is patentably distinct from the determination of whether the training output is desirable using error threshold as described in Guyon, p 0082 and the metrics of classifier quality and classification confidence measures described in Guyon, p 0207.

Applicant respectfully submits that the Examiner interprets the claim language in light of the supporting disclosure per our General Reply to Claim Rejections – 35 USC §112. Therefore, applicant respectfully requests the traverse of Examiner Hirl's rejection.

Conclusion

In view of the above remarks and arguments, applicant submits that all claims are patentably over the prior art and all claim rejections under 35 USC §101 and 35 USC §112 are overcome. Therefore applicant submits that this application is in condition for allowance, which action applicant respectfully solicits.

Conditional Request for Constructive Assistance

If for any reason this application is not believed to be in full condition for allowance, applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to MPEP para. 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,

Shih-Jong J. Lee